



# NASA Langley's Wireless Sensor for Pharmaceutical Packaging and Monitoring Applications

Wireless, passive SansEC sensor for detecting package tampering, medication levels, temperature, spoilage, and other pharmaceutical applications

NASA Langley researchers have developed a wireless, open-circuit SansEC [Sans Electrical Connections] sensor that can be used for pharmaceutical applications without the need for physical contact. Many attributes of a container can be monitored, such as liquid or powder levels, temperature of contents, and changes caused by spoilage. Tampering can also be detected. The unique design of this thin-film sensor allows many of these properties to be measured with the sensor external to the container/package. Fill levels can be measured without the need to open the container. At the core of the technology is the NASA award-winning SansEC sensor, which is damage resilient and environmentally friendly to manufacture and use. The sensors use a magnetic field response measurement acquisition device to provide power to the sensors and to acquire physical property measurements from them.

## Benefits

- The sensor can detect damage to the package or container
- One sensor can be used for multiple measurements, including biological decay and temperature
- Receives power wirelessly, eliminating the need for a sensor power source connection
- Sends signals wirelessly to the data acquisition device, eliminating signal wiring
- Sensor is a single electrical component—no wires, no electrical connections
- Can be mass produced and is well suited for manufacture to a specific size
- Can operate inside a package or container, protecting the sensor from damage by environmental elements

partnership opportunity





## The Technology

The SansEC sensor is an electrically open circuit without electrical connections. Having a device without circuits eliminates a common failure source of electrical systems. It consists of a uniquely designed thin-film electrically conductive geometric pattern that stores energy in both electric and magnetic fields. When wirelessly interrogated from the portable data acquisition system (U.S. Patent Number 7,159,774, Magnetic Field Response Measurement Acquisition System), the sensor becomes electrically active and emits a wireless response. The magnetic field response attributes of frequency, amplitude, and bandwidth of the inductor correspond to the physical property states measured by the sensor. Container damage, temperature, spoilage, or substance level is detected by changes in resonant frequency read by the accompanying magnetic field data acquisition system. A unique feature of the sensor is its ability to measure more than one physical attribute at the same time. In addition, by eliminating electrical connections, damage to any area of the sensor will not prevent it from being powered or interrogated.

## Applications

The technology offers wide-ranging market applications, including:

- Package tampering detection
- Medicine dosage monitoring
- Food/pharmaceutical spoilage detection
- Pharmaceutical/food container level monitoring



Sensor used for measuring container liquid or powder level without the need to open the container



Sensor used for monitoring dosage taken from a blister pack

## For More Information

If your company is interested in licensing or joint development opportunities associated with this technology, or if you would like additional information on partnering with NASA, please contact:

The Technology Gateway

National Aeronautics and Space Administration

**Langley Research Center**

Mail Stop 218

Hampton, VA 23681

757.864.1178

LARC-DL-technologygateway@nasa.gov

[technologygateway.nasa.gov](http://technologygateway.nasa.gov)

[www.nasa.gov](http://www.nasa.gov)

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